

**Statement of David Garman
Assistant Secretary for
Energy Efficiency and Renewable Energy
before the
Subcommittee on Energy
Committee on Science
U.S. House of Representatives
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Chairman Biggert, Members of the Subcommittee, I appreciate the opportunity to testify on the FY 2005 President's Budget request for the Office of Energy Efficiency and Renewable Energy (EERE).

The Department allocates more funding for the Office of Energy Efficiency and Renewable Energy than it does for any other energy program office. The overall EERE budget request for FY 2005 is \$1.25 billion, \$15.3 million more than the FY 2004 appropriation.

My testimony today will specifically address each of the Subcommittee's questions.

- 1. Please provide the fiscal year 2004 enacted level and the President's fiscal year 2005 request for the following programs individually.**

Industrial Technologies. The FY 2005 request for Industrial Technologies is \$58.1 million, \$35.0 million less than the FY 2004 appropriation. Our budget requests for this program have been consistent over the past several years as we have shifted some of this funding to the weatherization assistance program. We believe this is a proper and justifiable reprioritization. The industrial sector is already the most energy-efficient of our economy. Moreover, in contrast with low income Americans helped by the Weatherization Assistance Program, our energy intensive industrial partners are not only capable of implementing energy savings measures, they have "bottom-line" incentives to do so.

Beginning in FY 2005, the Department proposes to shift a portion of its R&D portfolio to focus on multi-industry *Grand Challenges* for next generation manufacturing and energy systems technologies. These *Grand Challenges* typically require high-risk investment for high-return gains to achieve much lower energy use than current processes. *Grand Challenges* examples include cokeless ironmaking (steel industry); an alternative reduction technology to produce aluminum with less energy and emissions (aluminum industry); advanced melting technology (glass and metal casting industry); and distillation technologies (chemical industry).

Biomass and Biorefinery Systems R&D. Biomass and Biorefinery Systems R&D focuses on advanced technologies to transform the Nation's domestic biomass resources into high value chemicals, fuels, and power. In FY 2005, the Department is requesting \$81.3 million for biomass program activities, which is \$12.6 million less than the FY 2004

appropriation.. However, it is important to note that the FY2004 appropriation required the use of \$13 million in prior year balances, and most available balances were in the Biomass program. After accounting for the use of prior year balances, the actual new budget authority provided to the Biomass program in FY 2004 was \$75.0 million, just slightly more than our FY 2005 request. Moreover, the FY 2004 appropriation included nearly \$41.0 million, or nearly half of the biomass budget, targeted to specific projects not identified in program plans. Congressional earmarking has delayed progress toward the program goals and diminished core research capabilities at the National Laboratories.

Our planned biomass activities are focused on advanced biorefinery technologies to produce low cost sugars, syngas and pyrolysis oils. In FY 2005, the thermochemical program will test the continuous production, cleanup and conditioning of biomass syngas and pyrolysis oils suitable for conversion to fuels, chemicals or hydrogen, and examine the production of hydrogen from biomass via synthesis gas. Work will continue with industry on improved process integration capabilities for industrial biorefineries, and the program will evaluate existing partnerships for more productive and lower-cost cellulase enzyme systems. Projects to test and evaluate the performance and costs of converting corn fiber to fuels and products will also continue. The program also supports ongoing R&D on processes for the production of chemicals and materials that can be integrated into biorefineries. Additional work with industry, universities and the national laboratories will focus on improvements to increase the efficiency of individual process steps.

Distributed Energy Resources. The Distributed Energy Resources Program leads a national effort to develop a flexible, smart, and secure energy system by integrating clean and efficient distributed energy technologies that complement the existing grid infrastructure. By producing electricity where it is used, distributed energy technologies can increase grid asset utilization and reduce the need for upgrading some transmission and distribution lines. Also, because distributed generators are located near the point of use, they allow for the capture of the waste heat produced by fuel combustion through combined heat and power systems.

In FY 2005, we are requesting \$53.1 million, a \$7.9 million reduction from the FY 2004 appropriation. This is consistent with our FY 2004 request. We are reallocating funding within the Distributed Energy Program's programmatic areas given advances made in previous years and changes within our overall energy R&D portfolio. Specifically, in the area of industrial gas turbines, we have chosen to curtail funding support for research involving hydrogen applications to avoid duplication of research. In the area of reciprocating engines, we are reducing the scope of our activities in areas that are perceived to be within private industry's capabilities. We are requesting less funding amount in the area of thermally-activated technologies, as the program is completing existing efforts on heat pumps and refrigeration in FY 2004.

Building Technologies. The FY 2005 request for the Building Technologies program is \$58.3 million, a \$1.6 million reduction from the current appropriation. Our solid state lighting research will create the technical foundation to revolutionize the energy

efficiency, appearance, visual comfort, and quality of lighting products. Our FY 2005 request for solid state lighting is \$10.2 million, a \$5.0 million increase compared to FY 2004 appropriations.

Our request continues efforts to integrate renewable energy technologies into highly energy-efficient buildings that produce as much or nearly as much energy as they consume on an annual basis (zero energy buildings). We believe that a systems approach is necessary to better advance zero energy building technologies into the marketplace.

In FY 2005, the Department anticipates issuing rules regarding: minimum efficiency standards for electric distribution transformers; minimum efficiency standards for commercial central air conditioners; minimum efficiency standards for residential furnaces and boilers; and test procedures for electric distribution transformers.

Solar Energy Technology. The FY 2005 budget request for Solar Technology is \$80.3 million. This is a slight increase over the unencumbered FY 2004 appropriation of \$79.7 million, but slightly less than the total appropriation of \$83.4 million, which included \$3.6 million earmarked to specific recipients.

The photovoltaic program is focused on next-generation technologies such as thin-film photovoltaic cells and leap-frog technologies such as polymers and nanostructures. The FY 2005 request of \$75.4 million for photovoltaic includes: \$30 million for critical fundamental research, including \$2.1 million to equip the new Science and Technology Facility at the National Renewable Energy Laboratory; \$29 million for advanced materials; and \$16.4 million for technology development efforts to improve reliability. The FY 2005 \$2.9 million request for Solar Heating and Lighting will support efforts on hot water and space heating for residential and commercial buildings in collaboration with industry partners.

Last year, we did not request funding for Concentrating Solar Power. In light of recent studies we sought from an independent engineering firm, a draft of which was reviewed by the National Research Council, the Department proposes \$2 million for Concentrating Solar Power in FY 2005 to support a more thorough investigation of the appropriate R&D course needed to realize its potential. The FY 2005 budget request will maintain essential facilities and support work with several States while allowing us to develop a longer term R&D plan.

Hydrogen, Fuel Cells and Infrastructure Technologies. The FY 2005 budget request for Hydrogen Technology is \$95.3 million, a \$13.3 million increase over the FY 2004 appropriation. Much of the proposed increase is for hydrogen safety research. This includes safety testing and analysis on bulk storage systems, fuel dispensing equipment, and piping to support new codes and standards specific to hydrogen. The Department has worked with the Department of Transportation and other agencies to coordinate efforts on hydrogen codes and standards. Under this activity, we will also develop system safety requirements for producing hydrogen and sensors to detect hydrogen leaks.

Research undertaken in the Hydrogen Technology Program is also targeted to reduce the cost of distributed hydrogen production from electrolysis and natural gas reformation. An enhanced focus on electrolysis, as recommended by the National Research Council, may lead to cost competitive production of hydrogen from renewable energy at \$2.30 per gallon of gasoline equivalent by 2015.

One of the major technical obstacles we face is developing the means to store sufficient amounts of hydrogen aboard the vehicle to provide a driving range of greater than 300 miles. The FY 2005 budget provides funding for innovative storage technologies to be pursued under our "Grand Challenge" to leading universities and national laboratories so that we get the best minds at our universities and national labs to tackle this challenging problem.

The Hydrogen program is also stepping up its efforts on education at all levels, so Americans know what the hydrogen economy will mean for them, their businesses, and the environment, and understand how to handle hydrogen safely in their communities.

Our hydrogen work is well integrated with work in the Fuel Cell and Vehicle Technologies programs. Together, these programs represent the majority of the Federal efforts comprising the Hydrogen Fuel Initiative, and we have published very specific, measurable technical goals against which to measure our progress. If we achieve our technical objectives, the automotive and energy industries will be in a position to consider commercialization by 2015, with mass market availability of both vehicles and refueling infrastructure by 2020.

However, while the FY 2004 EERE appropriation for hydrogen technology was approximately \$82 million, roughly half of those funds were earmarked for specific projects that are not wholly consistent with our research plan or the recommendations of the National Research Council. As a consequence, we must delay some very important work in areas such as hydrogen storage and production. Thus our ability to meet our established research targets in the specified timeframes may be in jeopardy.

The FY 2005 request for Fuel Cell Technologies is \$77.5 million, an increase of \$12.3 million from the FY 2004 comparable appropriation. Fuel Cell technology plays an important role in both the FreedomCAR Partnership and the Hydrogen Fuel Initiative that seek to effect an industry decision by 2015 to commercialize hydrogen-powered fuel cell vehicles.

The major focus of the Fuel Cell Technology program continues to be high risk research and development to overcome technical barriers, centered on core research of key fuel cell components, with industry focused on engineering development of complete systems. The DOE effort funds major fuel cell suppliers, universities and national laboratories to develop materials and component technology aimed at lowering cost and improving durability, two major barriers to commercialization. Fuel cell research funded in this program is targeted to reduce the cost of transportation fuel cell systems by a factor of 10 from a 2003 baseline.

The FY 2005 Fuel Cell technology budget also continues support of our Vehicle Validation effort, a “learning” demonstration program that integrates real-world operation of real-world vehicles with the required refueling infrastructure provided by major energy suppliers (the refueling portion of this effort is funded through the Hydrogen Program). This effort will play a significant role in integrating fuel cell vehicle and hydrogen activities while helping us measure progress and determine remaining challenges.

Wind and Hydropower Technologies. The FY 2005 budget request for Wind Energy is \$41.6 million, \$290,000 more than the FY 2004 appropriation, which included \$1.4 million in funds that were earmarked to specific recipients. The \$12 million request for Low Wind Speed Technology research and development will support multiple large wind system technology pathways to achieve the goal of three cents per kilowatt-hour for onshore systems. It also supports new work in off-shore systems to help achieve a cost goal of five cents or less per kilowatt-hour. FY 2005 activities will include field testing of the first full-scale low wind speed technology prototype turbine and fabrication and testing of advanced drivetrains, power converter and blades for future low wind speed turbines. The \$17 million request for supporting research and testing will engage the capabilities of the National Labs, universities and private sector for technical support including both facility and field tests of newly developed components and systems to ensure design and performance compliance.

The FY 2005 budget request for Hydropower Technologies is \$6.0 million, a \$1.1 million or 22 percent increase over the FY 2004 appropriation. The Department’s research approach involves a unique combination of computer modeling, instrumentation, lab testing and field-testing that is improving the design and operation of the next generation of hydropower technology. The request will support development of technologies that will enable hydropower operators at existing plants to generate more electricity with less environmental impact. This will be done through environmentally enhanced, improved efficiency turbines, as well as with new methods for optimizing unit, plant, and reservoir systems to increase energy production per unit water. Supporting research and testing will improve understanding of fish response to the physical stresses experienced in passage through turbine systems. The program will also explore ways to harness undeveloped hydropower capacity without constructing new dams.

Geothermal Technology. The FY 2005 budget request for Geothermal Technologies is \$25.8 million, a \$300,000 increase from the FY 2004 appropriation of \$25.5 million, which included almost \$2.0 million in funds that were earmarked to specific recipients. The program focuses on developing technology that optimizes the use of geothermal energy through improved exploration, drilling, reservoir engineering, and energy conversion. These technology improvements lead to cost-effective energy production at new geothermal fields and expanded production at existing fields.

FY 2005 resource development activities will characterize and assess the geothermal resource by understanding the formation and evolution of geothermal systems, including a collaborative effort with the U.S. Geological Survey on a national geothermal resource

assessment. Activities in the Enhanced Geothermal Systems program seek to increase the productivity and lifetime of reservoirs, potentially more than doubling the amount of viable geothermal resources in the West. FY 2005 activities will include Enhanced Geothermal System field tests in California and Nevada, and tests of the Diagnostics-While-Drilling advanced drilling system in a high temperature geothermal well.

Weatherization & Intergovernmental Programs. In FY 2005, we are requesting \$291.2 million for the Weatherization Assistance Program, \$64.0 million more than the FY 2004 appropriation. This request supports the President's commitment to increase funding for the Weatherization Assistance Program by \$1.4 billion over ten years. The FY 2005 request will support weatherization of approximately 119,000 low-income homes, saving \$1.30 in energy costs for every dollar invested over the life of the homes. With this level of funding we reach about half of the eligible families that applied for assistance.

Intergovernmental activities promote rapid deployment of clean energy technologies and energy efficient products. The FY 2005 budget requests \$40.8 million for State Energy Program grants. These grants and the funds they leverage allow State governments to target their own high priority energy needs and expand clean energy choices for their citizens and businesses.

The request for Gateway Deployment activities is \$29.7 million, \$5.4 million less than last year's appropriation. The 2002 reorganization brought these programs together under one umbrella with the hope that we would achieve synergies among the various programs, all aimed at delivering the full menu of efficiency and renewable resources with a clear community and customer focus. By shifting the emphasis from the program to the needs of the end user, we provide a "gateway" to a variety of specialized technical and financial assistance.

The International Renewable Energy Program provides technical assistance to support sustainable development and emerging market economies. In FY 2005, we request \$6.5 million for international activities, a \$612,000 increase from the FY 2004 appropriation, which included nearly \$2.7 million in funds that were earmarked to specific recipients.

In FY 2005, we request \$5.5 million for Tribal Energy Activities, an increase of \$594,000 over the FY 2004 appropriation. The program provides assistance to Native American Tribes and Tribal entities in assessing energy resources, comprehensive energy plan development, energy technology training, and project development. Again, this is an area where Congressionally-directed spending totaling \$3.2 million, or more than half of our funding, inhibits our ability to provide competitive funding opportunities for tribes.

We are also requesting \$4.0 million dollars for the Renewable Energy Production Incentive, which will create an incentive similar to the renewable production tax credits available to investor-owned utilities for public power providers.

Federal Energy Management Program. In FY 2005, we are requesting \$19.9 million for the Federal Energy Management Program (FEMP), \$1.8 million less than the FY 2004

appropriation. FEMP alternative financing programs have become a leading source of funds for agencies that need to meet their energy efficiency goals. Federal agencies access private sector financing to fund energy improvements through Energy Savings Performance Contracts (ESPC) and Utility Energy Service Contracts at no net cost to taxpayers.

As the Subcommittee knows, statutory authority for ESPCs expired on September 30, 2003. Without this valuable tool, it's highly unlikely that the Federal government will be able to meet its energy efficiency and renewable energy goals without a substantial funding increase to support direct financing of energy efficiency and renewable energy projects. A permanent reauthorization of ESPCs was included in the comprehensive energy legislation passed by the House last year and we encourage Congress to reinstate this authority as soon as possible. In the absence of comprehensive legislation, we would support a stand-alone provision for the reauthorization of ESPCs.

The Departmental Energy Management Program specifically focuses on DOE facilities and operations. The FY 2005 request for Department Energy Management Program activities is \$2.0 million, about the same as the FY 2004 appropriation.

FreedomCAR and Vehicle Technologies. In FY 2005, the Department is requesting \$156.7 million for the Vehicle Technologies program, \$21.3 million less than the FY 2004 comparable appropriation but comparable to our prior year request. Last year we were provided with additional funding for combustion engine and fuels research we did not seek.

Activities in this program contribute to two cooperative government/industry initiatives: the FreedomCAR Partnership and the 21st Century Truck Partnership. The FY 2005 request of \$91.4 million for the vehicle technologies portion of the FreedomCAR Partnership focuses on advanced high-efficiency combustion engines and hybrid vehicle technologies such as high-powered batteries, materials and power electronics. This important work in engine and hybrid components can lead to short- and mid-term reductions in petroleum dependency and is also compatible with our long-term vision of affordable and widely available hydrogen fuel cell vehicles.

The 21st Century Truck Partnership has similar objectives but is focused on heavy vehicles. The partnership involves key members of the heavy vehicle industry, truck equipment manufacturers, hybrid propulsion developers, and engine manufacturers along with other Federal agencies. The effort centers on improving and developing engine systems, heavy-duty hybrids, parasitic losses, truck safety, and idling reduction. The FY 2005 request for 21st Century Truck activities is \$56.1 million.

2. This year's budget makes almost no mention of the Climate Change Technology Initiative. What has happened to the program, and why has the Administration decided to de-emphasize it?

The Administration remains committed to a comprehensive, innovative program of domestic and international initiatives to reduce greenhouse gas emissions. The Administration will spend more than \$4 billion during this fiscal year on climate change science and technology R&D, about half of which is focused on climate change technology. For FY 2005, the Bush Administration has requested increases in a number of key investments, including the Hydrogen Fuel Initiative, Carbon Sequestration, Generation IV Nuclear Systems, and the International Thermonuclear Experimental Reactor. President Bush also supports an additional \$4 billion in tax incentives to spur the use of clean, renewable energy and energy-efficient technologies.

The Fiscal Year 2005 EERE budget request includes \$3 million to support a modest but important aspect of the President's National Climate Change Technology Initiative (NCCTI). This funding would be used to explore novel concepts, technologies or technical approaches, not elsewhere considered that could, if successful, contribute in significant ways to the reduction, avoidance or permanent sequestration of greenhouse gas emissions. This funding would be used for competitive solicitations of research grant proposals and supporting analysis. In addition, the Administration's Climate Change Technology Program (CCTP), which helps implement the President's NCCTI, is developing a government-wide inventory of climate change technology research, development, and deployment so that NCCTI priorities can be identified. The new inventory will be based on a broad set of criteria and will be more comprehensive than previous crosscuts. To support the work of the CCTP (e.g., developing strategic planning documents, modeling, etc), the Department requests \$3 million within Renewable Energy Program Direction.

3. The President's Management Agenda (PMA) includes government-wide provisions on budget and performance integration that has [sic] been implemented through the Program Assessment and Rating Tool (PART). In addition, the PMA also introduced R&D Investment Criteria that were piloted in DOE's applied R&D programs. Please provide examples of how you prepared data under these requirements, how those data were used for budget and management decisions, and how these activities dovetail with the Government Performance and Results Act of 1993.

The principles of the R&D investment criteria, both the general criteria and the additional criteria for industry-relevant programs, have largely been incorporated into the R&D PART, implicitly and explicitly. For example, one PART question asks whether a program assesses and compares the potential benefits of efforts within the program and to efforts of other programs. In order to do so, the Department must develop a consistent framework for estimating public benefits, which we have been working on as part of the R&D investment criteria initiative for several years. Thus, to support the PART and the

R&D investment criteria, the applied R&D programs continue to prepare benefits estimates, and to work on improving the comparability of these estimates through the use of common modeling techniques, assumptions, and scenarios.

Both the PART and the R&D investment criteria initiatives have been used to improve budget planning, development, and prioritization. For example, the PART and the R&D investment criteria highlight the importance of planning and prioritization. (An entire section of the PART is devoted to planning, and one of the R&D criteria is: "Programs must have complete plans, with clear goals and priorities.") In response, EERE enhanced its efforts to develop multiyear technology plans and roadmaps that chart a clear course for achieving program goals. The plans incorporate input from industry to ensure relevance and include off-ramps to ensure that we don't continue R&D pathways that are not promising. Most EERE programs are also now using independent peer reviews to ensure the quality and performance of their R&D projects and to help identify priorities. Clearly, the PART and the R&D investment criteria have furthered the Department's efforts to pursue sound management practices and improve program performance.

Application of the criteria has also played an important part in our funding decisions. For example, we reduced support for activities in programs that help certain industries that have the ability and incentive to conduct energy-efficiency research on their own (e.g., Industrial Technology Program). We have also emphasized areas not as inclined to attract private investment without federal leadership (e.g., fuel cell activities). Also, our Buildings Technology program was refocused to support longer-term, breakthrough technologies that can have a dramatic impact, such as solid state lighting, and reduce support for energy-efficient technologies available on the shelf today for builder and consumer use.

The Government Performance and Results Act and PART requirements are alike in many ways, perhaps most importantly in that they both require articulation of measures and targets and an assessment of performance against those targets. The PART goes beyond GPRA by standardizing an evaluation process for programs based on purpose, planning, and management as well as results. The PART enhances and complements GPRA.

4. Using the definitions in OMB Circular A-11, what is the proposed mix of funding in the fiscal year 2005 budget request between basic research, applied research, development, demonstration, and deployment activities for your office? Please provide the comparable fiscal year 2004 numbers for comparison.

The table below presents the information that was submitted to OMB's MAX database for the A-11 R&D "character classifications." It should be noted that A-11 only includes definitions for basic research, applied research, and development, and those are the only three R&D character classes for which OMB collects data.

	(budget authority in thousands)		
	FY 2003	FY 2004	FY 2005
Energy Efficiency and Renewable Energy			
Basic Research.....	30,577	31,115	30,092
Applied Research.....	279,895	303,533	269,228
Total, Research.....	310,472	334,648	299,320
Development.....	371,842	394,614	345,608
R&D Equipment.....	5,415	6,086	5,450
R&D Facilities.....	770	4,000	7,500
Total, Research and Development.....	688,499	739,348	657,878

EERE's has also estimated deployment expenditures for Fiscal Years 2003 -2005 as shown below.¹ Because demonstrations can support both development and deployment, we do not identify “demonstration” as a separate category.

	(budget authority in thousands)		
	FY 2003	FY 2004	FY 2005
Energy Efficiency and Renewable Energy			
Deployment.....	428,951	430,347	471,329

In conclusion, we believe the Administration’s FY 2005 budget request for energy efficiency and renewable energy technologies reflects a robust, balanced and consistent approach toward meeting the Nation’s energy goals of increased energy security through utilization of diverse domestic supplies, greater freedom of choice of technology, and reduced financial costs and environmental impacts of energy utilization.

Through the use of research and development investment criteria, we are not only mindful of how much we spend on these programs, but also the manner in which we operate and the results we are achieving. We are increasingly successful in linking our expenditures with performance and results. We are striving to achieve more work in the laboratory with every research and development dollar entrusted to our stewardship.

This completes my prepared statement, and I am happy to answer any questions the Subcommittee may have.

¹ These numbers include the full budget for the Weatherization and Intergovernmental Program (WIP), including activities that are not authorized by the Science Committee, such as Weatherization Assistance, the State Energy Program, Cooperative Programs with States (FY03), and others. The WIP share of the deployment funding shown here is \$310 million in FY 2003, \$304 million in FY 2004, and \$362 million in FY 2005.